Progress Presentation-I

e-Yantra Summer Intership-2016
Tiva based Daughter Board For Firebird V

Ayush Gaurav
Nagesh K
Mentors:
Piyush Manavar
Saurav Shandilya

IIT Bombay

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Overview of Project

- Project Name: Tiva based Daughter Board For Firebird V.
- Objective: To design and develop a daughter board for firebird V with the following criterion:
  1. Tiva Based Platform.
  2. On board Programing facility.
  3. Direct compatibility to Firebird.
- Deliverables:
  1. Final schematic.
     - Launchpad based daughter board
     - TM4C123GH6PM based daughter board
  2. Working daughter board.
  3. Working codes for I/O, PWM, position encoders, lcd, wired and wireless communication, ADC.

Overview of Task

Task	Deadline	Status
Understaing daughter board. List the pins of daughter board. Familiarize with Tiva C series Launchpad.	3 days	Completed
Finalize the platform to design	3 days	Completed
Design the schematic. Check compatibality with Firebird.	2 days	Completed

Overview of Task

Task	Deadline	Status
Discuss and add the necessary features to achieve maximum functionality.	3 days	completed
Finalize the schematic.	1 day	completed

Task Accomplised

- Familiarization with Tiva Launchpad. Interfaced the following:
  - GPIO
  - Timers and its interrupts.
  - External interrupts.
  - Pulse Width Modulation.
  - UART and its interrupts.
  - Wired and wireless
  - Analog to digital converter.
  - LCD.
- Studied the circuits to run the micro-controller.
- Analyzing the pins of firebird.
- Assigning the pins of uC.
- designing the schematics.

Pin Assignment of uC based board

Pin Out	Pin Name	Functionality	PIN On New Daughter Board
2		ir prox 8	IN0 ex
3		ground	
4		DATA+	PC4 (Confirm which is RX)
5		DATA-	PC5
6		VCC USB	Connect TO VCC of FT232
11		Sharp IR 1	PE0(lm324 1)
12		ir 1	PE1
13		Zigbeerx	PC7
14		Zigbeetx	PC6
15		sharp 2	PE2(lm324 2)
16		ir prox 2	PE3
22	RS	connected to RS of LCD normal I/O	PF0
23	RW	connected to RW of LCD normal I/O	PF1
24	EN	connected to EN of LCD normal I/O	PF2
25	DB5	data pin of lcd normal I/O	PD5
26	DB4	data pin of lcd normal I/O	PD4
27	DB6	data pin of lcd normal I/O	PD6
28	DB7	data pin of lcd normal I/O	PD7
29	V Battery System	ADC to check the level of battery voltage	
30	WL1	ADC of MCU	PD2
31	WL2	ADC of MCU	PD1
32	WL3	ADC of MCU	PD0

Pin Assignment of uC based board

Pin Out	Pin Name	Functionality	PIN On New Daughter Board
36	WL4	adc/ nc	in 1 ex
37	WL5	adc /nc	in 2ex
38	WL6	adc/nc	in 3 ex
39	WL7	adc/nc	in 4 ex
41	Sharp Sensor 3	ADC	PD3 (lm 324 3)
42	IR prox 3	ADC	PE5
43	IR prox 4	ADC	PE4
44	sharp sensor 4	ADC	in 5 ex (lm 324 5)
45	sharp sensor 5	ADC	PB4 (lm358 1)
46	ir prox 5	ADC	PB5
50	PWM L	left motor PWM(timer pin in PWM mode)	PF3
51	L1	left motor pin1 normal I/O	PB0
52	L2	left motor pin2 normal I/O	PB1
53	R1	right motor pin1 normal I/O	PF4
54	PWM R2	right motor PWM(timer pin in PWM mode)	PA6
55	R2	right motor pin2	PA5
62	Position encoder left	int	PA4
63	Position encoder right	int	pa3
68	C2Pwm	NC	
69	IR Prox6	ADC	in 6 ex
70	IR Prox7	ADC	in 7 ex
71	Buzzer	normal I/O pin	PA2

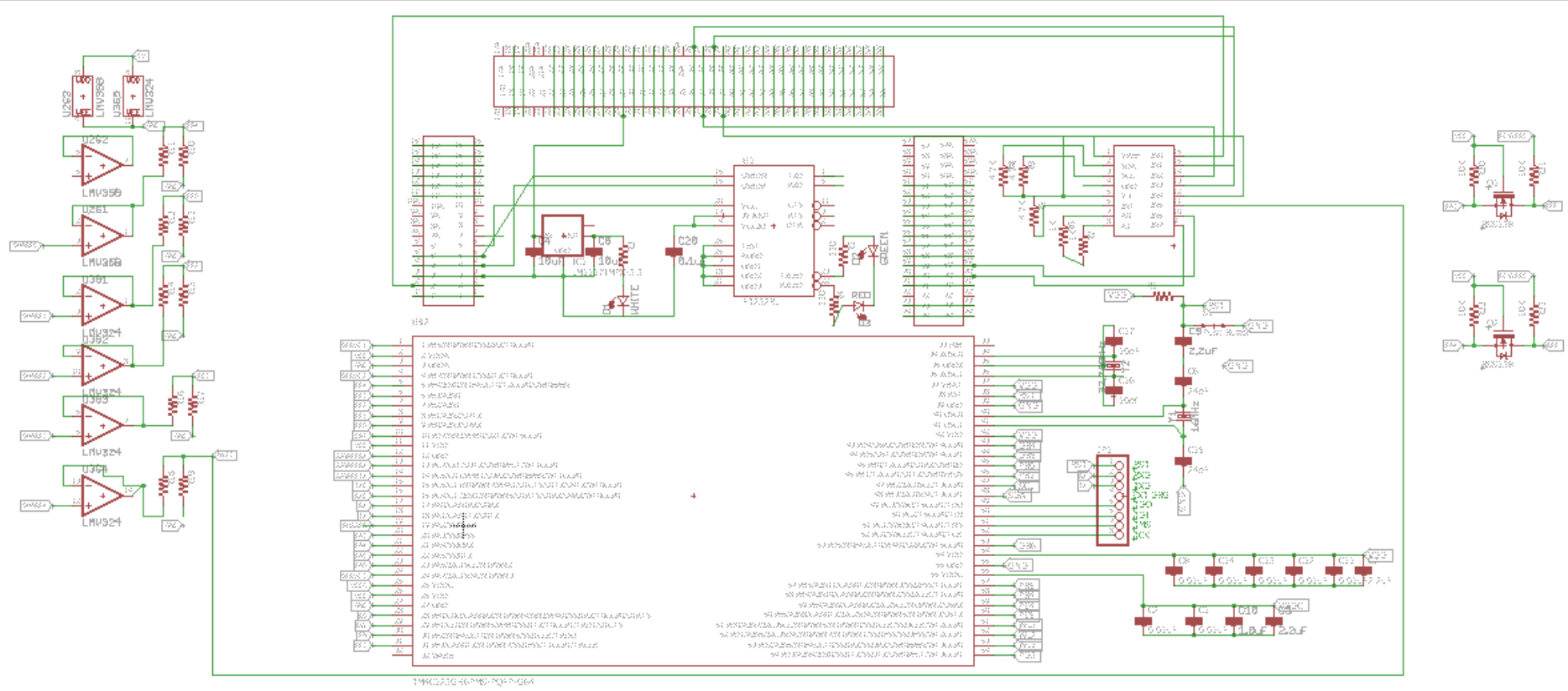
Pin Assignment of launchpad based board

Pin Out	New PIN on Daughter Board	Pin Name	Functionality
2	EXTERNAL ADC -0		ir prox 8
11	PB4		Sharp IR 1
12	PB5		ir 1
13	PB1		Zigbeerx
14	PB0		Zigbeetx
15	EXTERNAL ADC -1		sharp 2
16	PD0		ir prox 2
22	PD6	RS	connected to RS of LCD normal I/O
23	5V	RW	connected to RW of LCD normal I/O
24	PD7	EN	connected to EN of LCD normal I/O
25	PA3	DB5	data pin of lcd normal I/O
26	PA2	DB4	data pin of lcd normal I/O
27	PA4	DB6	data pin of lcd normal I/O
28	PA5	DB7	data pin of lcd normal I/O
30	PE1	WL1	ADC of MCU
31	PE2	WL2	ADC of MCU
32	PE3	WL3	ADC of MCU
36	EXTERNAL ADC - 2	WL4	adc/ nc
37	EXTERNAL ADC - 3	WL5	adc /nc
38	EXTERNAL ADC - 4	WL6	adc/nc

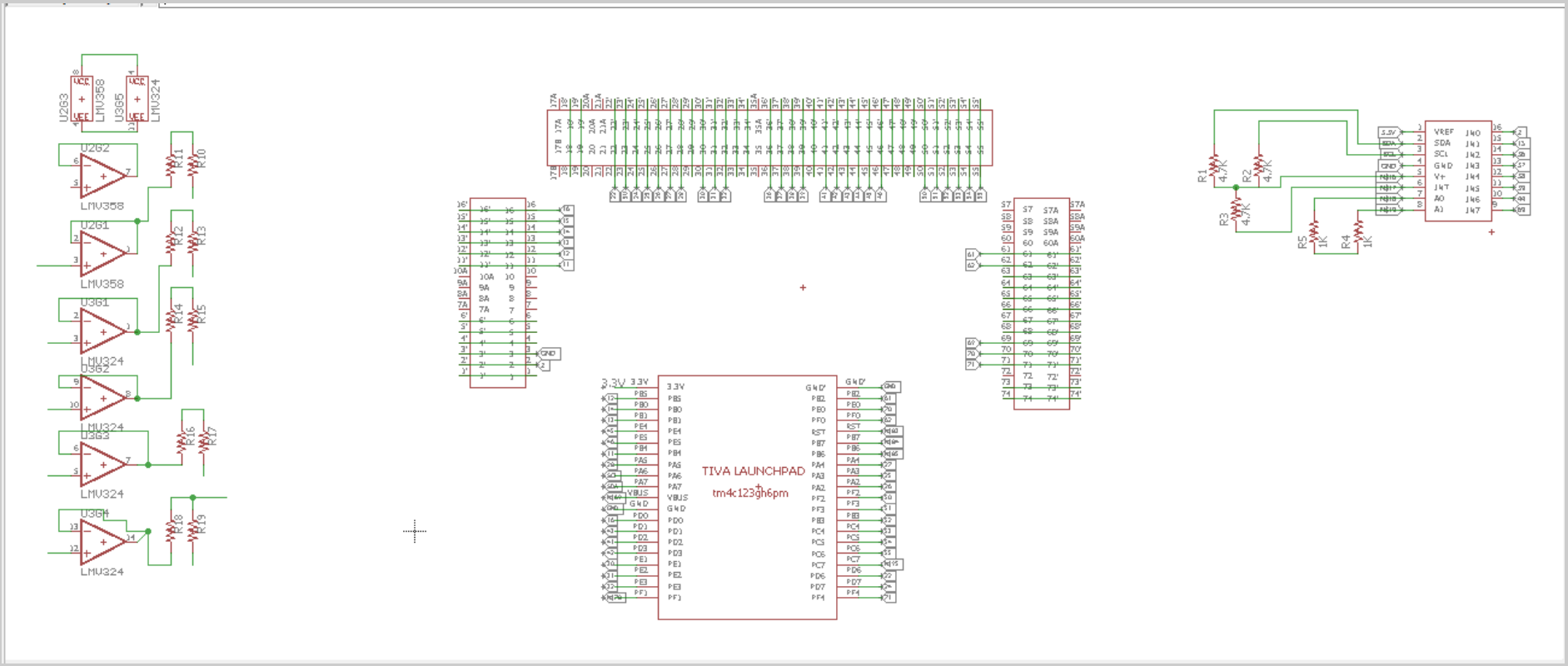
Pin Assignment of launchpad based board

Pin Out	New PIN on Daughter Board	Pin Name	Functionality
41	PD2	Sharp Sensor 3	ADC
42	PD3	IR prox 3	ADC
43	PD1	IR prox 4	ADC
44	EXTERNAL ADC - 6	sharp sensor 4	ADC
45	PE4	sharp sensor 5	ADC
46	PE5	ir prox 5	ADC
50	PF2	PWM L	left motor PWM(timer pin in PWM mode)
51	PF3	L1	left motor pin1 normal I/O
52	PB3	L2	left motor pin2 normal I/O
53	PC4	R1	right motor pin1 normal I/O
54	PC5	PWM R2	right motor PWM(timer pin in PWM mode)
55	PC6	R2	right motor pin2
62	PB2	Position encoder left	int
63	PF0	Position encoder right	int
69	EXTERNAL ADC - 7	IR Prox6	ADC
70	PE0	IR Prox7	ADC
71	PF4	Buzzer	normal I/O pin

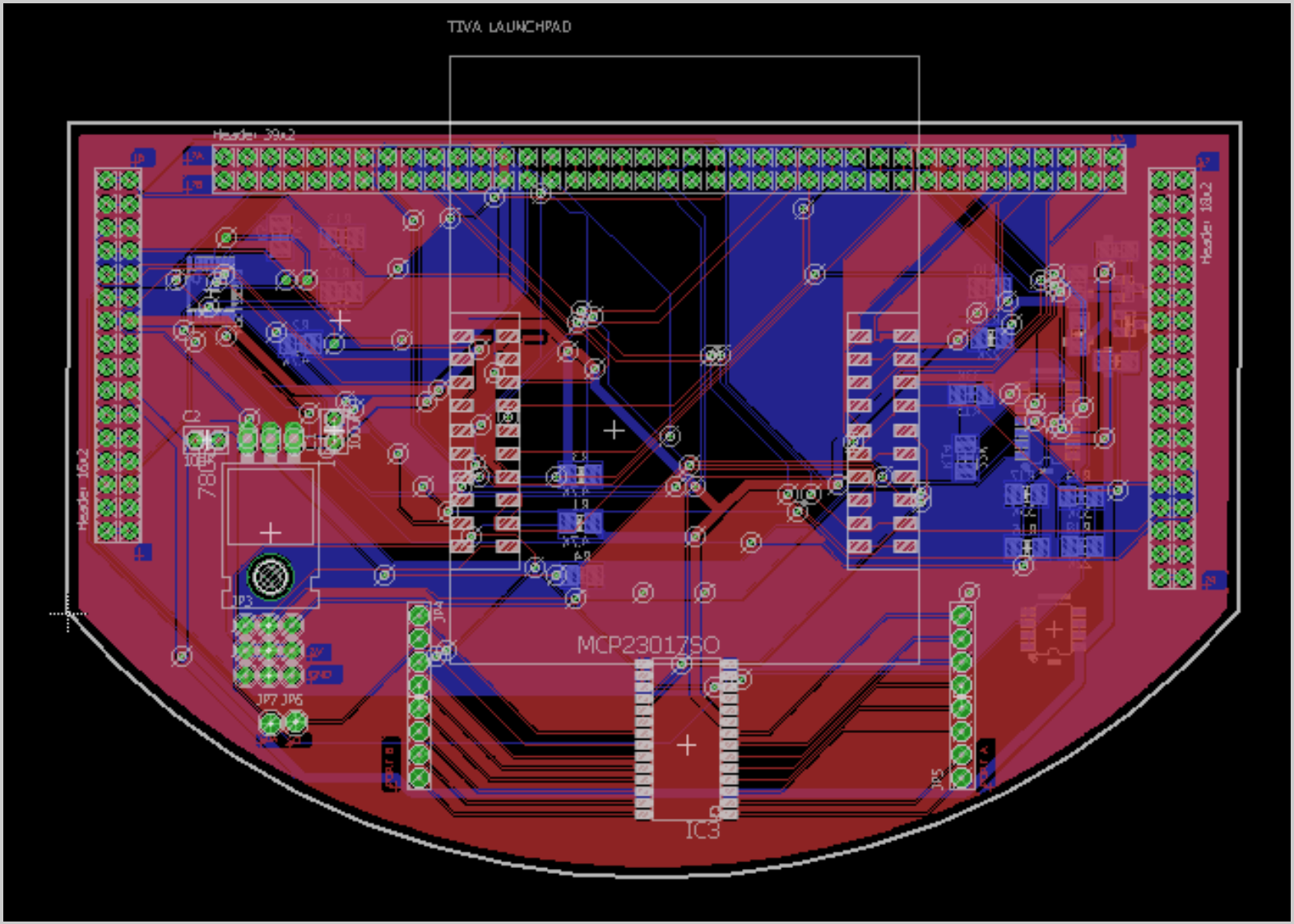
Schematic of uC based board



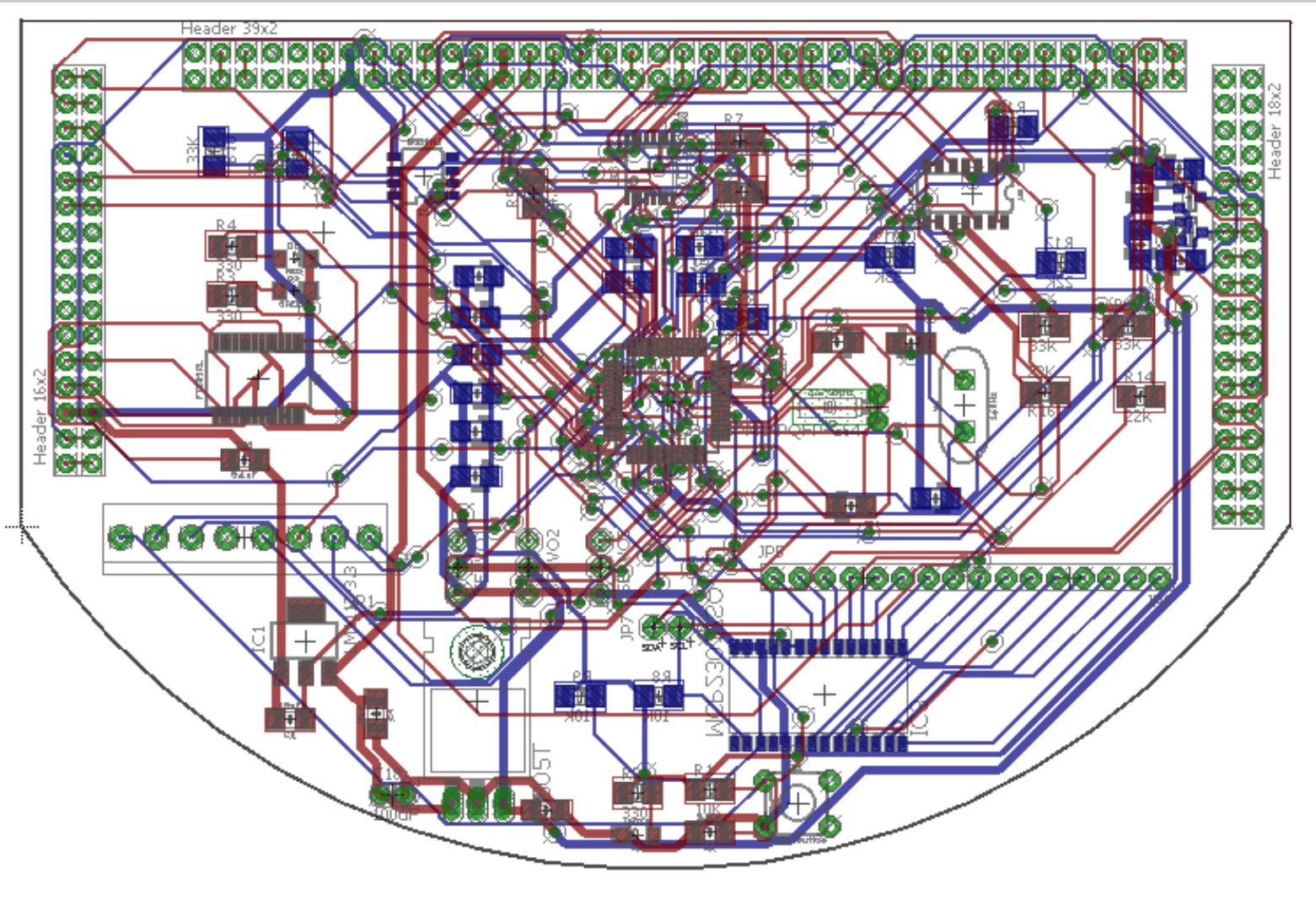
Schematic of launchpad based board



Layout of launchpad based board



Layout of uC based board



Challenges Faced

- Voltage incompatibility.
- Pin availability.
- number of sensors on firebird
- Nonavailability of firmware to program the board.
- Interfacing 5V compatible sensors with 3.3V compatible uC.
- Separate power supply for servo motors.

Future Plans

- Working Daughter board in next 2 weeks.
- All the working codes.
- Proper hardware manual by the end of the internship period.

Thank You

THANK YOU !!!